

Pharmaceuticals

Centritherm Application Bulletin 7-01-2609

One second contact time on the heating surface Low temperature evaporation from 25°C

Now there is a way of gently concentrating or evaporating solvent from pharmaceutical products with minimal or no damage to their active properties.

The Centritherm® evaporator is a unique system for the concentration of, and solvent removal from, a range of health industry products including, pharmaceuticals, plant extracts, biological derivatives, enzymes and nutraceuticals.

The active constituents in pharmaceutical products are some of the most difficult and sensitive compounds to process. Preserving such constituents, that may be enzymes, proteins or other heat sensitive components, is extremely important to the efficacy of the final product and critical in Pharmaceutical applications.

As most active ingredients are heat sensitive the preservation of these compounds during the concentration stage of the manufacturing process is of paramount importance. Solutions are continuously being sought in how to retain full functionality of these constituents during evaporation.

The Centritherm® evaporator provides these solutions!

Key benefits of the Centritherm evaporator for the Pharmaceutical industry include:

- Minimal to no damage of active constituents.
- Exceptionally short residence times (approximately 1 second).
- Low operating temperatures from 25°C (i.e. vacuum evaporation).
- Low hold-up volume, ideal for concentrating small batches.
- Production of high quality concentrates.
- High concentrations achieved with no product recycle.
- Hygienic system with built-in CIP.

The Centritherm® Evaporator

The Centritherm evaporator is a thin-film, spinning cone system that uses centrifugal force to ensure that the product is evenly distributed across the heating surface. With its unique design, the unit develops the thinnest liquid film possible in any evaporator system. This film is only 0.1 mm thick and crosses the heating surface in about 1 second resulting in a well defined residence time. In this brief time the liquid receives all the heat it requires to evaporate the product to its final concentration.

Further details regarding the operating principle of the Centritherm evaporator may be found at www.flavourtech.com

Preservation of Active Ingredients

As is well known, active ingredients contained in many Pharmaceutical products are prone to heat denaturation. To minimise thermal degradation and consequent loss of functionality, the action of the spinning cones in the Centritherm evaporator reduce the contact time between the heating surface and the product to approximately 1 second.

Centritherm evaporators are usually operated at an evaporation temperature of 50°C and a steam temperature of 120°C. However, due to the heat sensitive nature of some compounds, these conditions may be adjusted to reduce

Products

Listed are just some of the products that are processed in Centritherm evaporators.

Enzymes

Amylase
Cellulase
Papain
Pepsin
Rennet

Antibiotics

Allicin
Bacitracin
Cycloserine
Oxytetracycline
Penicillin
Streptomycin
Tylosin

Pharmaceuticals & their intermediates

Cyclocapron
Dextran
Ephedrine
Glyoxal
Shikimic acid

Biological derivatives

Albumin
Blood plasma
Collagen
Gamma globulin
Gelatin
Gland extract
Insulin
Liver extract
Pancrease extract
Pancreatin
Rennet
Fish oil extract

Amino Acids

Glutamic Acid
Lysine
Tryptophan

Plant extracts

Alacin
Alkaloids
Aloe vera
Carrageenan extract
Chlorophyll
Grape seed extract
Green Tea
Valerian root extract

Vitamins

Vitamin C
Vitamin E
Vitamin B5



Centritherm® evaporator model CT1-09RM - An ideal unit for small scale operations.

the temperature difference and further reduce thermal impact. For example, lower operating temperatures, from 25°C, and steam temperatures of 70-90°C are currently used for manufacture of various enzymes and protein fractions.

Low Hold-Up Volumes

When dealing with high value products it is comforting to know that the hold-up volume in a Centritherm evaporator is extremely small. Even in the largest model, that can evaporate almost 5,000 kg/hr of water, the hold-up volume is **only seven litres**.

High Concentrations

Where the product is to be thermally dried using, for example, a spray or fluidised bed dryer, the Centritherm evaporator can be used as a pre-concentrator. The technology's high efficiency evaporates more solvent (aqueous or organic) per unit area, providing a higher single pass concentration ratio than traditional plate or tubular evaporators. This not only reduces the load on the dryer, providing the potential for increased capacity, but also causes less damage during the drying process. **Less damage, better quality products!**

Flexibility

The nature of the Centritherm evaporator process, low hold-up volume and high heat transfer rate, make the unit particularly suitable for a range of applications. This includes processes dealing with small batches, multiple products and high value products.

The low cost of the smallest model, the CT1-09RM, makes it ideal for individual processes. It is often used by Pharmaceutical companies as a dedicated unit for specific products in order to eliminate any possibility of cross contamination.

Alternatively, many nutraceutical and pharmaceutical manufacturers process a number of different products on one unit, as the Centritherm evaporator is ideal when a rapid turnaround between products is required. At least one natural extract producer uses a single Centritherm evaporator unit to process approximately 200 different products each year.

Scale up from the small CT1-09RM to larger models is also simple, as demonstrated by the many companies using the CT1-09RM for Research & Development (R&D) work.

Hygienic System

During the Centritherm evaporator design process, particular care is taken to ensure that the unit satisfies the customer's hygiene and cleaning requirements. All product contacting surfaces are manufactured from high grade 316 stainless steel and an effective Clean-In-Place (CIP) function is an integral part of the Centritherm evaporator design. Further more, the evaporator body may be readily dismantled for inspection and validation of product contact surfaces.

Quality Design and Construction

The Centritherm evaporator is manufactured to the highest standards and according to GMP regulations. Units can be certified to meet a number of accreditation requirements and in cases where the Centritherm evaporator is situated in a 'hazardous area' or, is removing flammable solvents, the system can be manufactured to meet the requirements of local regulatory bodies.

For further details regarding this unique thin-film evaporator, please visit www.flavourtech.com

Model	Evaporation Capacity kg/hr*	
	Water from sugar solution	50% Ethanol from extract
CT1-09RM	50	70
CT2-40FT	260	360
CT6-40FA	800	1100
CT9-90FA	2400	3300
CT12-130FA	4800	6700

Water from sugar solution

Feed assumed as 12°Bx sugar solution, viscosity 0.75 cP (50°C). Concentrate assumed as 65°Bx sugar solution, viscosity 30 cP (50°C). Evaporation temperature 50°C, steam temperature 120°C.

50% Ethanol from extract

Feed assumed as 12°Bx extract, viscosity of 0.75 cP (50°C). Concentrate assumed as 65°Bx extract, viscosity of 30 cP (50°C). Evaporation temperature 50°C, steam temperature 120°C.

* Capacities are approximate only



A Centritherm® evaporator model CT-12 with pre-evaporator fitted for use in a pharmaceutical application in Asia.

Flavourtech is an Australian based company specialising in innovative process technologies including the:

- 💧 Centritherm® Evaporator
- 💧 Spinning Cone Column
- 💧 Integrated Extraction System
- 💧 Rotating Disc Column
- 💧 Resin Adsorbing Column

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Contact details are continually updated at flavourtech.com